

What is claimed is:

1. A process for making engineered lignocellulosic-based panels, said process comprising:
  - 5 adding to green lignocellulosic particles before the green particles are dried a low-nitrogen content, high molecular weight, phenol-formaldehyde resin in an amount from about 1 to 25 weight percent based on the total weight of the particles, wherein the first resin is phenol-formaldehyde resin having a nitrogen content of from 0 to 3%, a viscosity of about 20 to 2000 cps, and a molar ratio of formaldehyde/phenol of from 1.2 to 3.0;
  - 10 drying the green particles to obtain dried particles having a moisture content of from 1 to 8 %;
  - adding a second resin in an amount from about 1.7 to 8 weight percent based on the total weight of the particles; and
  - consolidating the dried particles under heat and pressure.
- 15 2. The process of Claim 1 wherein the low-nitrogen content, high molecular weight, phenol-formaldehyde resin has a solids content of from about 10 to 70%.
3. The process of Claim 2 wherein the low-nitrogen content, high molecular weight, phenol-formaldehyde resin has a pH of from about 7 to 14.
- 20 4. The process of Claim 1 wherein the low-nitrogen content, high molecular weight, phenol-formaldehyde resin has an alkalinity of from about 4 to 15.
- 25 5. The process of Claim 1 wherein a wax is added in conjunction with the second resin.
6. The process of Claim 5 wherein the wax is a petroleum based slack wax added in an amount of from about 0.25 to 3 percent, based on a wt % of solid binder to oven-dry wood.
- 30 7. The process of Claim 1 wherein the second resin is selected from the group of phenol-formaldehyde resole resins and polymeric diphenylmethane diisocyanate resins.
- 35 8. The process of Claim 7 wherein the second resin is a powdered or liquid phenol-formaldehyde resole resin.

9. The process of Claim 7 wherein the second resin is a polymeric diphenylmethane diisocyanate resin.

10. The product made from the process of Claim 1.

11. A process for making engineered lignocellulosic-based panels, said process comprising:

adding to green lignocellulosic particles before the green particles are dried a low-nitrogen content, high molecular weight, phenol-formaldehyde resin in an amount from about 5 to 15 weight percent based on the total weight of the particles, wherein the first resin is phenol-formaldehyde resin having a nitrogen content of from 0 to 1%, a viscosity of about 50 to 300 cps, and a molar ratio of formaldehyde/phenol of from 1.2 to 2.0;

drying the green particles to obtain dried particles having a moisture content of from 1 to 8 %;

adding a second resin in an amount from about 3 to 6 weight percent based on the total weight of the particles; and

consolidating the dried particles under heat and pressure.;

12. The process of Claim 11 wherein the low-nitrogen content, high molecular weight, phenol-formaldehyde resin has a solids content of from about 40 to 60%.

13. The process of Claim 11 wherein the low-nitrogen content, high molecular weight, phenol-formaldehyde resin has a pH of from about 9 to 12.

14. The process of Claim 11 wherein the low-nitrogen content, high molecular weight, phenol-formaldehyde resin has an alkalinity of from about 4 to 15.

15. The process of Claim 11 wherein a wax is added in conjunction with the second resin.

16. The process of Claim 15 wherein the wax is a petroleum based slack wax added in an amount of from about 0.25 to 3 percent, based on a wt % of solid binder to oven-dry wood.

17. The process of Claim 11 wherein the second resin is selected from the group of phenol-formaldehyde resole resins and polymeric diphenylmethane diisocyanate resins.

18. The process of Claim 17 wherein the second resin is a powdered or liquid phenol-formaldehyde resole resin.

19. The method of Claim 17 wherein the second resin is a polymeric  
5 diphenylmethane diisocyanate resin.

20. The product made from the process of Claim 11.